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BOTANY.—*Floral morphology of Ixophorus unisetus (Presl) Schlecht.* ERNEST R. SOHNS,¹ U. S. National Museum. (Communicated by Agnes Chase.)

Ixophorus, a monotypic genus in the tribe Paniceae (Gramineae), is placed among those grasses regarded as highly specialized. The spikelets are 2-flowered; the lower floret is staminate and the upper floret is perfect (but the rudimentary stamens of this floret are nonfunctional). This grass is related to *Setaria*, *Setariopsis*, *Chamaeraphis*, *Paratheria*, *Pennisetum*, the section *Paurochaetium* of *Panicum* and other genera having their spikelets surrounded and/or subtended by sterile branches. The spikelet (or spikelets), with surrounding or subtending bristle (or bristles), constitutes the fascicle.

The taxonomic position of this grass has been in doubt. The genus has been confused with other panicoid genera. The purpose of this paper is to clarify the morphology of the fascicle of this interesting species.

¹ Part of a thesis, "The Floral Morphology of *Cenchrus*, *Pennisetum*, *Setaria* and *Ixophorus*," submitted to the faculty of the Graduate School of Indiana University in partial fulfillment of the requirements for the degree doctor of philosophy. The writer is grateful to Dr. Paul Weatherwax for suggesting the problem and for helpful suggestions throughout the investigation.

Historical.—The species was first described by J. S. Presl (1830) as *Urochloa uniseta*, based on a specimen collected by Thaddaeus Haenke in Mexico. Schlechtendal (1861-1862), apparently having access only to Presl's description and to a drawing of a species of *Urochloa* from the Isle de France (pl. 11, f. 1, in the Atlas of Beauvois, Ess. Agrost. 1812) established the genus *Ixophorus*. He was not certain whether to assign the plant to a genus or to a section of *Panicum*, viz., ". . . so bilde ich aus diesen Pflanzen eine eigene Abtheilung, welche man Gattung oder *Panicum*-Section nach Belieben nennen mag, und bezeichne sie mit einem eigenen Namen: *Ixophorus*." Nevertheless, Schlechtendal properly described the genus (p. 420-421) and the combination was made in the index (p. 747). The resemblance of this species to *Panicum* led Trinius (1834) to transfer Presl's species to *Panicum*. Fournier (1886) transferred the species to *Setaria*. Vasey (1893), in naming grasses collected by Palmer in Sonora and Colima, Mexico, described Presl's species under *Panicum* (*P. pringlei*). *Setaria* is a name which was first applied to a genus of lichens by Acharius and later to a genus of grasses by Beauvois (Hitchcock, 1925). Beauvois' name has been conserved, but the homonym caused

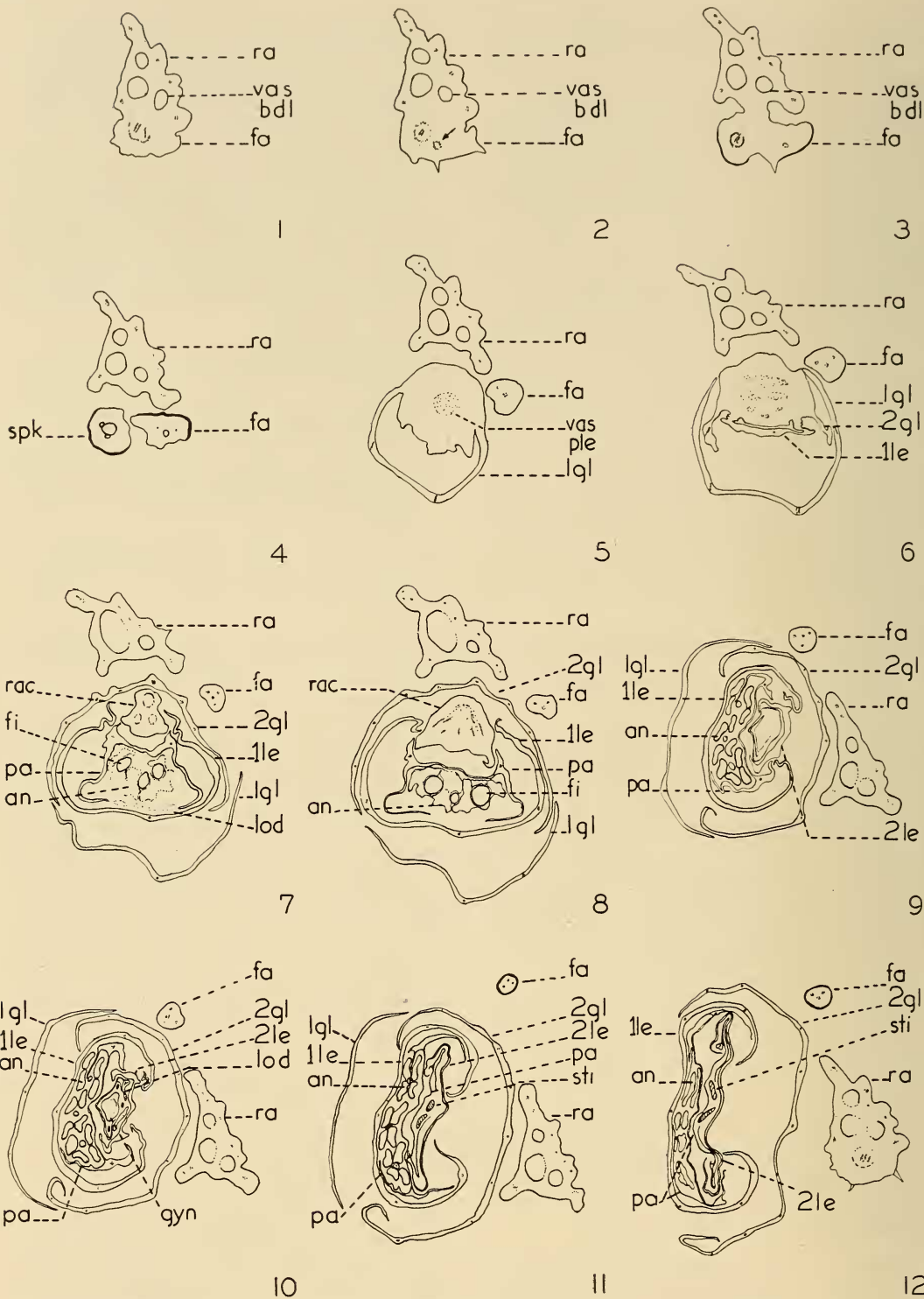


FIG. 1-12.—Diagrammatic transsections of the rachis and fascicle of *Ixophorus unisetus*. an—anther; fa—fascicle; fi—filament; 1 gl—first glume; 2 gl—second glume; gyn—gynoeceium; 1 le—lemma of the lower floret; 2 le—lemma of the upper floret; lod—lodicule; pa—palea; ra—rachis; rac—rachilla; spk—spikelet; sti—stigma; vas bdl—vascular bundle; vas ple—vascular plexus. All figures approximately X 25.

much trouble before it was included in *Nomina Generica Conservanda*. Nash (1895), seeking a valid name for *Setaria*, concluded that *Ixophorus* was the earliest valid name and transferred the species of *Setaria* to *Ixophorus*. Beal (1896) misapplied the name of the Australian genus, *Chamaeraphis*, to *Setaria* and *Ixophorus*. See Pilger (1928) for a history and discussion of the genus *Chamaeraphis*. Hitchcock (1936) stated that *Chamaeraphis* is "an Old World genus in which the articulation is below the spikelet-bearing branches, as in *Pennisetum*." F. Lamson-Scribner (1897) used the generic name *Ixophorus* and proposed a new species and a variety (both since relegated to synonymy under *I. unisetus*). The history of the genus and its synonymy was published by Hitchcock (1919).

Distribution and economic importance.—*Ixophorus unisetus* was first found in Mexico (Hitchcock, 1919). Its present distribution, based on specimens in the U. S. National Herbarium, includes Mexico, El Salvador, Guatemala, Honduras, Nicaragua, and Costa Rica; Cuba; Colombia, Venezuela, and Brazil. The grass is cultivated in all these countries and has been grown in Experiment Stations in the United States and Hawaii. It is reported to be a good, palatable, annual forage grass. This species is known under a dozen or more vernacular names, e. g., Copo sojo, Honduras grass, Mesmete, Molino grass, Pasto Atico, Pasto blanco, Pindiquia, Pitillo, Zacate blanco, Zacate dulce, Zacate conejo, Zacate de Honduras and Tonciro.

Material and method.—Material was collected at Quirigua, Guatemala, and provided by Dr. Paul Weatherwax. Fascicles were processed according to standard methods in microtechnique. All drawings were made with the aid of a camera lucida. Figs. 1–12 are diagrammatic drawings made from serial sections of a portion of an inflorescence.

Observations.—A diagrammatic transsection of the rachis (*ra*) is shown in Fig. 1. The vascular supply of the fascicle (*fa*) is indicated by the dotted area in the lower left of the figure, while the irregular circular areas represent vascular bundles (*vas bdl*) of the rachis. A transsection of the rachis shows a well-defined, cutinized epidermis and a central parenchyma area having small vascular bundles near the periphery and two to four larger, centrally located, vascular bundles. In fig. 2 the vascular mass of the fascicle is divided into two unequal areas, the smaller of which (indicated by an arrow) is the vascular

supply of the bristle and the larger is the vascular supply of the spikelet. Fig. 3 shows the relationship of the fascicle axis (*fa*) to the rachis (*ra*). The relationship of the fascicle axis (*fa*), spikelet (*spk*) and rachis (*ra*) is shown in Fig. 4. At the level of Fig. 5, the first glume (*1 gl*) is shown. The stippled area in the base of the spikelet represents the main vascular plexus (*vas ple*) of the spikelet. In Fig. 6, the first glume (*1 gl*), the second glume (*2 gl*), and the lemma of the lower floret (*1 le*) are shown. The organization of the lower floret is diagrammed in Fig. 7. The palea (*pa*) is strongly 2-keeled and each keel has a pronounced wing at maturity. The pistil does not develop and its vascular trace terminates blindly. The bases of the filaments (*fi*) are multicellular and thick. The three anthers (*an*) are indicated by outline. The lower floret has two lodicules (*lod*), which are large and well-developed, and the position of each is indicated by a dotted outline. The rachilla segment (*rac*) below the upper floret is shown at two successively higher levels in Figs. 7 and 8. The organization of the fascicle above the level shown in Fig. 8 could not be followed because shattering ruined subsequent serial sec-

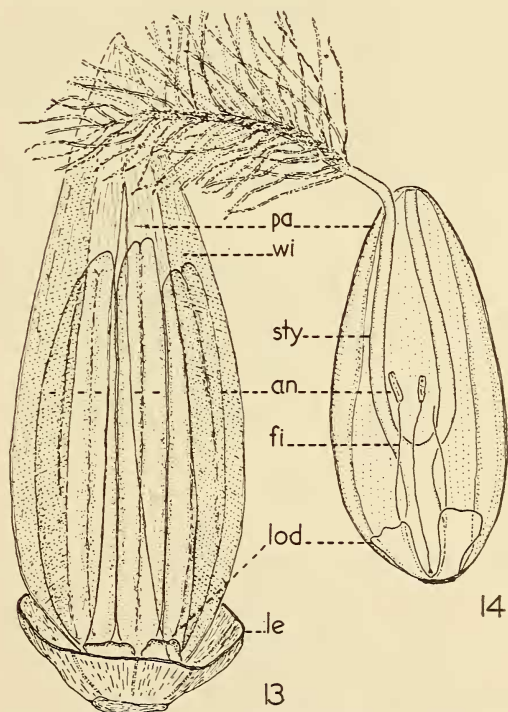


FIG. 13.—Lower floret of spikelet of *Ixophorus unisetus*. FIG. 14.—Upper floret of same spikelet. an—anther; fi—filament; le—lemma; lod—lodicule; pa—palea; sty—style; wi—wing. Both figures approximately $\times 7$.

tions. Another portion of the same inflorescence was selected to show the organization of the upper floret. The first of these diagrams is that of Fig. 9 showing the lemma (*le*). In Fig. 10, the upper floret is shown with two lodicules (*lod*), three filaments (*fi*) [shown as black dots], and a gynoceium (*gyn*). The palea (*pa*) of the upper floret is keeled, but the keels are not as prominent as those of the palea of the lower floret. At the levels in Figs. 11 and 12, the anthers (*an*) of the lower floret, and the stigmas (*sti*) of the upper floret are shown.

Examination of the material in the U. S. National Herbarium revealed no lower florets (Fig. 13) with pistils, but an upper floret (Fig. 14) occasionally has nonfunctional stamens. The anthers of the upper floret are small, empty, sac-like structures. In Fig. 14, one anther is missing as well as one branch of the stigma.

F. Lamson-Scribner (1897) used the character of smooth bristles as one criterion for separating *Ixophorus* from *Panicum*. Forty-one percent of the material in the U. S. National Herbarium has antorsely scabrous bristles. These bristles vary from scabrous at the base to half their length. The remainder (59 percent) of the material has viscid, smooth bristles. Smooth bristles have a heavy cuticle. The axis of the inflorescence varies from scabrous to pilose-pubescent. The individual plants range from 10 cm to 1 meter in height. These characters, whether taken separately or collectively, are of insufficient magnitude to warrant segregation of another species or a variety in this genus.

Discussion.—The fascicle of *Ixophorus unisetus* consists of a 2-flowered spikelet with a single bristle prolonged behind it. The bristle is interpreted as a continuation of the axis of the fascicle. The spikelet has two distinctly different florets. The lower is larger, membranous, staminate and the upper is smaller, indurated, and functionally pistillate. In addition, each floret has two well-developed lodicules. The paleas of both florets

are winged at maturity. The very small non-functional stamens of the upper floret, the presence of lodicules in both florets, and the wings on the paleas are types of specialization not common to most panicoid grasses.

Summary.—The taxonomic history and the morphology of the fascicle of the monotypic genus *Ixophorus* are presented in this paper. A morphological study of the fascicle indicates that this genus is separate and distinct in the *Panicaceae* and has specializations not common to most panicoid grasses.

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ENTOMOLOGY.—*A new species of Climacia from California (Sisyridae, Neuroptera)*. HARRY P. CHANDLER, California Department of Fish and Game, Red Bluff Calif. (Communicated by Ashley B. Gurney.)

The Sisyridae are small Neuroptera which are parasites in their larval stage on fresh-water sponges. Though widely distributed in North America, especially in the eastern half of the United States, they are frequently localized and are poorly known even to most

entomologists. The species here described constitutes the only record of the family Sisyridae from California that is known to the author, and this is the first time the genus *Climacia* has been recorded west of the Rocky Mountains.